

CLAIMS

1. A fuel cell system, comprising:

a fuel cell that generates electric power through
5 electrochemical reactions of oxygen included in an oxidizing
gas, which is flown through an oxidizing gas conduit provided
on a cathode side of an electrolyte membrane, with hydrogen
included in a fuel gas, which is flown through a fuel gas conduit
provided on a anode side of the electrolyte membrane; and
10 an electrostatic delivery module that is provided in at
least one of said fuel gas conduit and said oxidizing gas
conduit and effectuates electrostatic delivery of water
droplets flocculated in said at least one gas conduit to deliver
the water droplets out of said gas conduit.

15 2. A fuel cell system, comprising:

a fuel cell that generates electric power through
electrochemical reactions of oxygen included in an oxidizing
gas, which is flown through an oxidizing gas conduit provided
on a cathode side of an electrolyte membrane, with hydrogen
20 included in a fuel gas, which is flown through a fuel gas conduit
provided on an anode side of the electrode membrane;

multiple electrodes that are arranged in at least one
of said fuel gas conduit and said oxidizing gas conduit and
are covered with an insulator layer; and

25 a voltage application module that applies a voltage to
said multiple electrodes to effectuate electrostatic delivery

of water droplets flocculated in said at least one gas conduit and thereby deliver the water droplets out of said gas conduit.

3. A fuel cell system in accordance with claim 2, wherein said voltage application module applies the voltage to said
5 multiple electrodes to make an apparent positive-negative variation in voltage toward either an outlet or an inlet of said at least one gas conduit.

4. A fuel cell system in accordance with claim 3, wherein said voltage application module applies the voltage to said
10 multiple electrodes to make an apparent positive-negative variation in voltage toward one of the outlet and the inlet of said at least one gas conduit, which is located below the other.

5. A fuel cell system in accordance with any one of claims
15 2 through 4, wherein said multiple electrodes are placed at a specific position having a high potential for flocculation to water droplets in said at least one gas conduit.

6. A fuel cell system in accordance with any one of claims
20 2 through 5, wherein said fuel cell has a membrane electrode assembly that includes the anode and the cathode arranged across the electrolyte membrane, and a pair of electrically conductive separators that are placed across the membrane electrode assembly,

said oxidizing gas conduit is defined by the cathode and
25 a groove formed in one of the pair of electrically conductive separators,

said fuel gas conduit is defined by the anode and a groove formed in the other of the pair of electrically conductive separators, and

said multiple electrodes are placed in the groove of at least one of said fuel gas conduit and said oxidizing gas conduit.

7. A fuel cell system in accordance with any one of claims 2 through 6, said fuel cell system further comprising:

a driving state detection module that detects a driving state of said fuel cell; and

a voltage application control module that determines actuation or non-actuation of said voltage application module to apply or not to apply the voltage to said multiple electrodes, based on the detected driving state of said fuel cell.

8. A fuel cell system in accordance with claim 7, said fuel cell system further comprising:

a driving state specification module that determines whether the driving state of said fuel cell detected by said driving state detection module reaches a predetermined driving state having a high potential for flocculation to water droplets in said oxidizing gas conduit,

wherein said voltage application control module actuates said voltage application module to apply the voltage to said multiple electrodes, when said driving state specification module determines that the detected driving state of said fuel cell reaches the predetermined driving state.

9. A fuel cell system in accordance with claim 7, said fuel cell system further comprising:

a driving state specification module that determines whether the driving state of said fuel cell detected by said driving state detection module represents an excess water content,

wherein said voltage application control module actuates said voltage application module to apply the voltage to said multiple electrodes, when said driving state specification module determines that the detected driving state of said fuel cell represents the excess water content.

10. A fuel cell system in accordance with any one of claims 2 through 6, said fuel cell system further comprising:

a voltage application control module that controls said voltage application module to continuously apply the voltage to said multiple electrodes and thereby effectuate electrostatic delivery of the water droplets during an operation of said fuel cell.

11. A vehicle having a fuel cell system in accordance with any one of claims 1 through 10 mounted thereon.